

Attachment:

Memorandum of
Decision Re: Opinion
Testimony of Sy Ray of
ZetX

COMMONWEALTH OF MASSACHUSETTS

SUFFOLK, SS

SUPERIOR COURT

Docket No. 16-973

COMMONWEALTH

vs.

AMOS CARRASQUILLO

Docket No. 17-45

COMMONWEALTH

vs.

JULIO RAFAEL PIZARRO

Docket No. 17-46

COMMONWEALTH

vs.

AMANDA ALGARIN

MEMORANDUM OF DECISION RE:
OPINION TESTIMONY OF SY RAY OF ZETX

The three defendants in this case are charged with murder in the death of Jeffrey Kelly ("Kelly") outside a 7-Eleven on Center Street in Jamaica Plain. Much of the Commonwealth's case depends on plotting the location of cell phones based on cell site location information. The evidence suggests that each of the defendants was using a T-Mobile cellular phone. The T-Mobile records for each phone are already in evidence, including the raw information about the frequency of the calls, the time when calls were made, and the latitude and longitude of the cell towers used by each device during the initiation of each call.

The Commonwealth plans to call Sy Ray, the founder of a company called ZetX Inc. ("ZetX"), who has recently created a mapping program that uploads mobile phone records, integrates that data with antenna data provided by cellular phone companies, and plots a horizontal plane for each cellular phone antenna on a Google Earth map based on manufacturer specifications to locate a general area – the antenna's "hand-off" area – where Mr. Ray says the cellular device was almost surely located when it initially connected to the tower.¹ ZetX only began developing its mapping methodology, and its mechanism for plotting a horizontal plane for each cellular antenna, in 2014. Mr. Ray did the programming. The method for determining the horizontal plane for each antenna, however, is novel and proprietary, has not been tested by others besides ZetX, and has not been determined to have a particular error rate other than through anecdotal determinations (i.e. through periodic use of a drive test scanner, and determination in particular cases that a phone was not where it was predicted to be). There have been no peer reviewed publications about the ZetX methods, accuracy or error rates.

The applicable time in this case is late August 2016. According to Mr. Ray, there had been no drive testing to determine the accuracy of the data in Boston in 2016, nor was an error rate calculated for the data in 2016. Nonetheless, Mr. Ray is prepared to testify that there is a 97% chance (based on the anecdotal 3% error rate) that the suspect cellular device was within the plotted horizontal plane that his software depicts on the Google Earth maps for each particular phone call displayed. The ZetX mapping software has been used by a number of law enforcement agencies around the country, including the U.S. Secret Service. The Commonwealth has not provide the court with any indication that any of the law enforcement

¹ Mr. Ray first got involved in this case in mid-November 2018. He produced no expert report and the Commonwealth has not produced any written statement describing the opinions he might offer. See generally Mass. R. Crim. P. 14(a)(1)(A)(vi). The Commonwealth did not produce the video Mr. Ray proposes to use until the last few days.

agencies that have used the software in their law enforcement efforts have independently tested the ZetX mapping method to determine its accuracy.

DISCUSSION

The Commonwealth bears the burden to demonstrate a proposed expert's testimony meets the foundational requirements for admissibility under Mass. Guide to Evid. § 702.

Commonwealth v. Barbosa, 457 Mass. 773, 783 (2010). Under Section 702:

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if

- (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- (b) the testimony is based on sufficient facts or data;
- (c) the testimony is the product of reliable principles and methods; and
- (d) the expert has reliably applied the principles and methods to the facts of the case.

Mr. Ray has experience, training and in-service education in the area of cellular phone technologies, cell site location information, and the data provided by mobile phone companies about the specifications of their antennas. Moreover, an expert's specialized knowledge in locating cell towers and their relevant hand-off areas would certainly assist the jury to understand the voluminous cellphone data already in evidence. I find that Mr. Ray is qualified to offer expert testimony on the subjects at issue (the first clause of Rule 702) and that his testimony would assist the jury (Rule 702(a)).

Under Massachusetts law, Rule 702(b) and (c) are ordinarily satisfied if the court finds that the expert's evidence is generally accepted by the relevant scientific community.

Commonwealth v. Patterson, 445 Mass. 626, 640-641 (2005). I can make no such finding here. The Commonwealth has cited me to no reports, studies or other peer reviewed papers suggesting the ZetX mapping method is generally accepted in the relevant scientific community; or even that its accuracy has been tested by any of the law enforcement agencies that have chosen to use it. The Commonwealth has not cited me to any judicial decisions – published or unpublished – that have evaluated the technology and found it admissible against any serious Daubert challenge.²

Nor are the recommended Guidelines on Cell Phone Forensics (2007) published by the National Institute of Standards and Technology (“the NIST Report”) (marked as Exhibit O for identification) sufficiently detailed to set out a roadmap, if ZetX followed it, for the design of a cell phone mapping program.³ According to the NIST report at page 63:

Call detail records can also be used with cell site tower information obtained from the service provider to translate cell identifiers into geographical locations for the cells involved and identify the general locale from which calls were placed. While plotting call record locations and information onto a map can sometimes be useful, it does not necessarily provide a complete

² Although Mr. Ray testified his opinions have been subject to multiple admissibility hearings in state and federal court, the Commonwealth has not provided a single decision by any court in the country finding ZetX’s methods generally, or specifically its algorithm for plotting a horizontal plane for a cell tower antenna’s hand-off area, to be reliable. A Westlaw search on November 27, 2018 for “Zetx or “Sy Ray” identified only a single potentially relevant case, Ross v. State, 2018 WL 3968479 (Tex. Ct. App. Aug. 20, 2018), which reports at * 4 that “Sy Ray from ZetX performed a geolocation analysis from appellant’s T-Mobile phone records.” There is no indication that Mr. Ray used the same methods in Ross that he used here, or that there was any challenge to the admissibility of his analysis in that case. I recently presided over a trial in Commonwealth v. Cummings, et al., Suffolk Crim. Nos. 17-67, 17-68 and 17-69, in which ZetX software was used without challenge. The parties have cited me to a recent case from Middlesex County in which the Court (Henry, J.) excluded the ZetX evidence.

³ The Commonwealth has provided no more updated government publication than the NIST Report, which came out more than a decade ago, and long before ZetX began developing its proprietary software.

and accurate picture. Cell towers can service phones at distances of up to 35 kilometers (approximately 21 miles) and may service several distinct sectors. Radio frequency coverage maps maintained by the service provider can be obtained to create a more exact portrayal of the data for the sectors involved. . . .

Cell boundaries are somewhat fuzzy. Various factors, such as terrain, seasonal changes, antenna performance, and call loading, affect the coverage areas of cells and the plausible locale to associate with a call record. Detailed field tests and measurements may be required to ensure accuracy [of] the analysis. Such surveys are regularly performed by network operators to verify and improve network performance []. Tools also exist to aid law enforcement in performing cell site analysis and mapping activities independently.

The NIST Report does not describe how one could integrate radio frequency coverage maps maintained by a service provider to create a more precise portrayal of the data sectors implicated by a particular mobile phone call; the type of field tests required to ensure accuracy; the assumptions which must be made to more accurately perform a cell site analysis or mapping function; or how to estimate the horizontal plane of a cellular antenna's "hand-off" area to account for the "[v]arious factors" that may "affect the coverage areas of cells and the plausible locale to associate with a call record."

Having failed to prove "general acceptance," the Commonwealth may still succeed in offering expert testimony if it satisfies a full Daubert analysis. Patterson, 445 Mass. at 641. In such circumstances, "a proponent of scientific opinion evidence may demonstrate the reliability or validity of the underlying scientific theory or process by some other means, that is, without establishing general acceptance." Commonwealth v. Lanigan, 419 Mass. 15, 26 (1984). However, "[i]f the process or theory underlying a scientific expert's opinion lacks reliability, that opinion should not reach the trier of fact." Id. The court must serve a "gatekeeper role." Id.

Here, the particular method ZetX uses to map the cell towers on a Google Earth map, and the azimuth or directionality of those antennas, is uncontroversial and is not challenged. The question here is the mechanism ZetX uses to plot a horizontal plane as the area where the device connecting to the cell tower antenna was at the time it connected. In this regard, the Commonwealth's showing amounts to "trust ZetX." Other than explaining that the ZetX program uses the data input from the T-Mobile records and manufacturers data about the antennas provided by the cell tower owners,⁴ the Commonwealth has utterly failed to explain how ZetX's program maps the horizontal plane for the cell tower's hand-off area. It has not explained the assumptions that underlie the program or how the program alters its estimate of an antenna's coverage area based on drive test scanner data. Nor can I assess in any meaningful way the program's accuracy or reliability.

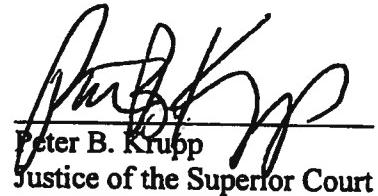
The ZetX program is testable. That is, one could make one or more cellphone calls from known locations, upload the cellphone records from those particular calls, and see if the plotted horizontal plane includes the known locations of the cellphone when it made these controlled calls. It is not clear if ZetX has done this. Mr. Ray testified and I credit his testimony that ZetX receives data from a drive test scanner to determine error rates. But he did not explain how the drive test scanner works, what data is received or analyzed, or how systematically or anecdotally such information is collected. Even if the drive test scanner works as the hypothetical test calls I initially described in this paragraph, I cannot determine from the information provided by Mr. Ray the frequency or generalizability of the drive test scanner results. He has not presented his anecdotal error rates in terms of distance or actual number of errors, and has not described them

⁴ Mr. Ray testified that the manufacturers' data ZetX uses to determine and plot the horizontal plane for a cell tower antenna's "hand-off" area takes into account manufacturer testing of the antenna in a special chamber.

regionally or nationally, or in rural or urban environments where cell tower density is quite different. In short, the Commonwealth has given me very little to go on. I simply cannot determine based on the evidence presented over the two days of the Daubert / Lanigan hearing whether ZetX's mapping of the horizontal plane of a cell tower antenna's "hand off" area is reliable.

Of course, much depends on what Mr. Ray would testify about the mapped areas shown as a result of his mapping function. If the Commonwealth revises its presentation of Mr. Ray's testimony to address the concerns addressed in this decision, I would not foreclose the admissibility of some of Mr. Ray's work.

Dated: November 27, 2018



Peter B. Krupp
Justice of the Superior Court